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THE PHYSIOLOGICAL ASPECTS OF VERNER'S LAW

In the *JEGP.* 11, 1, ff. Prokosch offers an explanation of Verner's Law, based on Forchhammer's *Akzenttheorie*. According to Forchhammer, differences of stress are determined in ordinary speech more by widening and narrowing of the glottis than by strengthening and diminishing the force of the expiration from the lungs; widening of the glottis diminishes the stress, narrowing increases it. Applying this theory to the phenomena of Verner's Law, Prokosch finds it quite natural that the voiceless spirants should become voiced between two vowels, the second one of which was stressed, i. e., in $a\text{-}pá > a\text{-}ǵá$ the narrowing of the glottis for the stressed syllable began on the initial consonant of the syllable and this carried with it naturally the voicing of the consonant; this is merely a case of assimilation; and on the other hand, that in $\acute{a}\text{-}pa$ the consonant should remain voiceless is also quite natural; the opening of the glottis necessary for the unstressed syllable began on the initial consonant of the syllable, and this favored the retention of the voiceless spirant. In terms of Jespersen's symbols (ϵ =vocal chords, 1=narrow, 2=medium, 3=wide) the syllables $a\text{-}ǵá$ represent $\epsilon 2 + \epsilon 1$, and $\acute{a}\text{-}pa = \epsilon 1 + \epsilon 2$.

The first of these two propositions is undoubtedly true, but I believe that the second one is open to objections. If I understand the proposition correctly this means that the width of the glottis on an unaccented vowel is about identical with its width on a voiceless consonant. Is such an assumption correct? Aren't the vocal chords always nearer together when vibrating, even if for an unstressed vowel, than when they are inactive, as for a voiceless consonant? (cf. Sievers, *Phon.* p. 67.) But even if the two were identical, why should the vibration cease? Furthermore, if voiceless spirant and unstressed syllable coincide, why do we find the voiced consonant regularly in the pret. pl. and past partic. of strong verbs, i. e., in the types $*sni\acute{d}umá$, $*sni\acute{d}aná$? The syllables $\acute{d}u$, $\acute{d}a$ are no more strongly stressed than is the corresponding syllable in inf. $*sni\acute{p}anan$.

Again, if it be correct to say that the narrowing of the glottis for a stressed syllable begins on the initial consonant as in $a\text{-}ǵá$ the question arises: why did not the spirants also become voiced at the beginning of a word which had the accent on the first syllable?

But initially we find regularly *f þ h s*. (To be sure, *þ* did later become *ð*, as Got. *þeihan*, OHG. *dīhan*.) In other words, it seems to me that the Forchhammer theory of accent, which of itself is undoubtedly correct, does not furnish us with the key to a satisfactory explanation of the phenomena of Verner's Law.

I should like to present here a somewhat different statement of the facts as they appear to me. I may say that the following explanation is one that I have used in my classes for several years and was written in this form before I had read Prokosch's article. It is, therefore, in no sense a polemic against that author's excellent work. I submit it, however, because it still seems to me to be more satisfactory than other explanations which have been offered. At any rate, I hope it may evoke some criticism, either favorable or unfavorable.

In studying the physiological aspects of Verner's Law, our attention should, I think, be directed not primarily to the size of the glottis, nor to the increasing and diminishing of the force of the air-current, but rather to the *tension* and *vibration* of the vocal chords.

The retention of the voiceless spirants at the beginning of a word was due to the force of the initial dynamic accent. The voicing of the spirants medially, according to Verner's Law, is to be looked upon as an assimilation of the consonant to the surrounding voiced sounds, generally vowels. In producing a voiceless consonant, the glottis is wide open and the vocal chords are relaxed and do not vibrate; the production of voice, however, implies narrowing of the glottis with tension and vibration of the vocal chords. When a voiceless consonant becomes voiced between vowels, this means that the tension and vibration of the vocal chords is maintained, and not relaxed, throughout the three sounds. This assimilation of the voiceless spirants took place in PG. whenever the conditions of stress were not unfavorable to it: first, when the two surrounding vowels were about equally, but both slightly, stressed, as in 1st plur. pret. **hobumá*, or perf. partic. **haðaná*; and secondly, when there was a rapid increase of stress from the preceding to the following vowel, as in **faðár*, **siðún*, because increase of stress in voiced sounds implies also increase of tension of the vocal chords; hence, in passing quickly from a slightly stressed vowel to a strongly stressed one, there is no time to relax the tension in the middle of the process; it is much easier and more

natural for the tension of the vocal chords to increase steadily and uninterruptedly, i. e., for an intervening voiceless consonant to become voiced.

On the other hand, immediately after the strong stress has reached its highest point, there is a natural tendency, by way of *relief* and *contrast* and *reaction*, to release completely for a moment the tension of the vocal chords and to open wide the glottis, i. e., to pronounce a voiceless consonant; hence, in PG., in such forms as infin. **snīpanan*, **tīhanan*, **kēusanan*, and pret. sing. **snāīpa*; **tāiha*, **kāusa*, the consonant following the chief accent resisted the assimilation.

A parallel to this phenomenon is found in Modern English in the pronunciation of *x* in a number of words; where the accent precedes the *x*, this letter has the value of *ks*, i. e., is voiceless, as in *exit*, *exodus*, *exile*, *exercise*; but where the accent follows the *x*, this letter has the value of *gz*, i. e., is voiced, as in *example*, *examine*, *exonerate*, *exist*, *exact*, *exhibit*, *exempt*.

Dr. R. M. Ihrig of Cincinnati has recently called my attention to another parallel in Old Italian in the development of Latin *t*, *k*, and *k'* (palatal *k*) which became (or remained) respectively *t*, *k*, *c* (as in 'church'), i. e., voiceless, if the Latin accent preceded; but they became respectively *d*, *g*, *g* (as in 'edge'), i. e., voiced, if the Latin accent followed. In Modern Italian, this has been rather obscured by leveling and analogy. Examples are: Lat. *mūtō*, *amātus*, *sītis*, *laētus*, *grātus* > Ital. *muto*, *amato*, *sete*, *lieto*, *grato*, but Lat. *mūtāre*, *amātorem*, *quatērnus* > OItal. *mudare*, *amadore*, *quaderno*; Lat. *amīcus*, *amīca* > Ital. *amico*, *amica*, but Lat. *pacāre*, *acūtus*, *acūtāre*, *secāre* > OItal. *pagare*, *aguto*, *aguzzare*, *segare*; Lat. *plācet* > *piace*, but Lat. *placēre*, *vacillāre*, *ducēti* > OItal. *piagere*, *vagellare*, *dugento*. Similarly intervocalic *p* remained voiceless if the accent preceded, but became voiced *v* if the accent followed; Lat. *cāput* > *capo*, but Lat. *capīlli* > OItal. *cavelli*.

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